

PATENT SPECIFICATION

(11) 1275 571

DRAWINGS ATTACHED

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(54) IMPROVEMENTS IN OR RELATING TO BUCKLES

(71) We, DYNASAFE EQUIPMENT LIMITED of Dunstan House, 242 to 248, Kingsland Road, London E.8, and HOWARD WALL LIMITED, of 25 to 37, Hackney Road, London E.2, both British Companies, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to buckles for use with safety belts or harnesses such as are used on road vehicles and aircraft.

The invention relates specifically to a buckle for the above use with two separable parts held together by co-operating aperture and projection means provided by the two parts and latched together by a spring pressed slidable element of one part which is carried in a casing and which can be moved from a position in which it overlies a section of the second part when the projection and aperture means are in engagement into a position which allows the two parts to be separated.

The invention comprises a buckle of the type defined in which one part includes a plate having one or more apertures to which one or more strap end portions can be fitted and the second part, which includes the slidable element, has means by which the said part can be connected to a road vehicle or aircraft and a mouth into which part of the said plate can be placed, the said slidable element, when in the position in which the two parts are latched together, forming part of the surface of the buckle adjacent the said mouth such that the said slidable element can be moved by hand from that position into the position in which the two parts of the buckle can be separated.

The invention also includes a safety harness for a vehicle fitted with a buckle as defined above, and a vehicle when fitted with one or more of the said buckles.

Embodiments of buckles according to the invention are described hereinafter with reference to the accompanying drawings of which:

Figure 1 shows one part of one buckle according to the invention

Figure 2 is a section through the part shown in Figure 1,

Figure 3 is a rear view of a slidable element of the part shown in Figures 1 and 2,

Figures 4 and 5 are views of a channel member of the part shown in Figures 1 and 2,

Figures 6 and 7 are each views of two modified buckles according to the invention carried by a twin mounting,

Figures 8 and 9 show two different forms of another part of the buckle,

Figure 10 shows another buckle according to the invention

Figure 11 shows two harnesses using buckles according to the invention and in position in a road vehicle,

Figures 12 and 13 show a double snubber which could be used with the buckle of the invention

Figure 14 shows a frame forming part of a double snubber, and

Figures 15 and 16 show brackets of buckles according to the invention.

Figures 1 to 5 show one part of a buckle according to the invention and Figure 8 shows a second part of the buckle. The part shown in Figure 8 comprises a plate 24 with an aperture 43 for receiving a strap end portion 44 of a belt or harness and an aperture 42 for engaging a projection in the form of a bump 22 referred to hereinafter. The first part shown in Figures 1 to 5 comprises a casing 20 which has a retaining bump 22 referred to above and a channel 21 in which slides a slidable element 23. The first part includes a cable 25, which could be a plastics coated seven stranded metal cable, to provide a substantially rigid support for the casing. The cable is fixed to a lug 26 in any suitable manner. Lug 36 is connected by a rivet 30 to channel 21, a suitable hole 37 being provided in the channel 21 for the rivet 30. The channel 21 has a base 46 and sides 32, the front parts of which extend at right angles to the base 46 to form wings 33, and

the rear parts of which are "L" shaped to provide portions at right angles to the base and portions parallel to the base to form guide rails 34. Slots 35 are provided between the ends of the guide rails 34 and the wings 33 to house a retaining bar 31 which extends across the channel and into the walls of the casing 20. A flared mouth is defined by the base 46 and the sides 32 of the channel with the retaining bar 31, into which mouth one end portion of plate 24 can be slid. The base of the channel is provided with back stops 88 and 89 for the slidable element 23 and plate 24 respectively and with the bump 22 which is of circular shape in plan view to fit the aperture 42 in the plate 24, the bump 22 having an inclined surface towards the front of the channel to allow the plate 24 to be slid onto the bump 22 with ease. A tongue 36 is bent downwards from the base 46 to assist the fixing of the channel into the casing, and two holes 47 are provided in the base for the same purpose.

The end of the sliding element 23 provides part of the surface of the buckle adjacent the mouth defined by channel 21 and retaining bar 31. The slidable element 23 is provided with grooves 38 in its sides which slide on the guide rails 34 of channel 21, the grooves 38 being undercut as shown at 39 to reduce friction between the grooves and rails if the channel 21 should become deflected. The slidable element 23 has a vertical edge at 41 which engages the retaining bar 31 to prevent the slidable element 23 leaving the casing 20. A spring 27 fits onto a projection 28 of the casing 20 and into a hole 29 in the slidable element 23 to press the slidable element 23 into its normal latching position. The part of the slidable element 23 below the grooves 38 is provided with a wedge shaped face 40 to guide a front edge 45 of the plate 24 towards the base 46 when the aperture 42 of plate 24 is over bump 22.

In operation, the apertured part of the plate 24 is pressed into the mouth below the face of the slidable element 23 and its end 45 presses against the wedge shaped face 40 of the slidable element 23 and forces the sliding element 23 further into the casing against the pressure of the spring 27. When the edge of the aperture 42 in the plate 24 passes over the bump 22 in the channel 21, the wedge shaped face 40 of the slidable element 23 guides the end 45 of the plate 24 into the space below the slidable element until the end 45 of the plate 24 meets stop 89. The spring 27 then moves the slidable element 23 back into its normal latching position so that the plate 24 is tilted into a position parallel to the base 46 of the channel 21 and is latched in the casing.

To release the plate 24, the slidable element 23 is moved into the casing until it meets back stops 88, in which position the edge 40 is clear of the front 45 of the plate 24. The plate 24 is tilted away from the base 46 of channel 21 either manually or by pull on the strap

attached to the plate. Release of the slidable element allows the spring 27 to move the slidable element back to its normal position, the face 40 engaging the end 45 of the plate 24 forcing the plate from the casing if it has not already moved away.

If the buckles are used for adjacent seats of a road vehicle or aircraft, as shown in Figure 11, a twin mounting 49, as shown in Figure 6, could be used to support two modified first buckle parts. The modified first buckle parts differ only from that described above in that stems 48, instead of cables 25, are provided, with the stems rotatably mounted on spindle 52 to allow the casings 20 to be moved through 30 degrees or so to give adjustable positions for the buckle mouths. The angle of each buckle part can be adjusted by hand, or each buckle part can be coupled to its associated seat so that when the seat is moved backwards or forwards the angle of the buckle is adjusted automatically. The mounting stems 48 are shaped, as shown at 51, to allow for movement of the buckle parts. The twin mounting 49 is provided with a plastics cover 50 and fixed to the floor of the vehicle. Figure 7 shows a further modification in which the mounting 49 is fixed to a short bracket 53 (Figures 7 and 11) to bring the buckle parts nearer the seat level. The floor mountings can be made resilient if desired.

Two channels 21 can be attached to a single bracket comprising a swaged tube which is flattened at each end portion and drilled to accommodate a bolt for fixing the bracket to the floor at one end portion and, at the other end portion, a bolt to pass through the flattened end portion and holes 37 in the channels 21, one channel being mounted on each side of the bracket. The floor end portion of the bracket is bent so that the bracket stands at an angle of about 45 degrees to the floor and the corners can be bent towards the floor to prevent movement between the bracket and the floor.

If a buckle is to be used with a bench seat, the first buckle part described above can be modified by substituting a bracket as shown in Figure 15 for the cable. The bracket of Figure 15 comprises a plate 81 with holes 82 and 83. The bracket is connected to channel 21 by a rivet passing through hole 82 and hole 37 in the channel 21 (Figure 5). The bracket is connected to the bench seat by a bolt passing through hole 83. Figure 16 shows an alternative bracket which can be substituted for the bracket shown in Figure 15. It comprises a plate 84 with ears 85. The ears 85 each have a hole 86 so that two channels 21 can be joined to the bracket by joining one to each ear by means of rivets through holes 37 in the channels 21. The casings 20 are suitable modified. The bracket can be connected to one channel 21 only by modifying this channel so that it has a pair of ears, each being pierced, so that it can be joined to the bracket 84 by a bolt

passing through the holes 86 and the holes in the ears of the channel. The casing 20 is suitably modified. The bracket is connected to the bench seat by passing a rivet or bolt through hole 87 in the bracket and connecting it to a suitable fixing on the seat. In both cases rivets connecting the channels to the brackets allow the buckle parts to pivot on the rivets through the hole in the channel 21, or about the holes in the brackets, so that the buckle parts can be folded against the brackets when not required.

The plate 24 of the buckle previously described is provided with an aperture 43 to which a strap end portion 44 of the seat belt or harness can be attached. Figure 9 shows a modification which differs only in that it has two apertures 54 and 55. The strap shown in Figure 8 can form both the lap strap and chest strap of a harness or can be a short strap connected to a snubbing buckle, referred to hereinafter and the appended claims as a snubber, to which the lap and chest straps are connected. A double snubber, such as one of those shown in Figures 12, 13 and 14 referred to hereinafter could be used, the lap strap being adjusted at one snubber and the chest strap being adjusted at the second.

In the embodiments described above the hole 37 in the channel 21, by means of which the first buckle part is connected to a vehicle, has been approximately aligned with the bump 22. An embodiment of the invention in which the hole by means of which the buckle part is connected to a vehicle is offset from the bump is shown in Figure 10. In this embodiment a channel 54 has a base 65 and turned down arms 66 which are bent over parallel to the base to form a flat bottom 67. The base 65 forms a central partition in a casing 55 and a bump 57, which fits the aperture 42 in the plate 24 previously described, is formed on a separate plate 56 which is held in the arms 66 of the channel 54 by protrusions (not shown) which fit into recesses in the arms 66 and/or the flat bottom 67 of the channel 54. The base 65 of the channel is provided with a central slot 58 in which a slidable element 59 slides, the slidable element being made in two parts 59 and 60 which ride respectively on the upper and lower sides of channel base 65. The two parts 59 and 60 are secured together by rivet 61. The slidable element is pressed by two springs 62, one on each side of the rivet 61. The channel is connected to the vehicle by lug 63 of the buckle part which is provided with a fixing aperture 64. The mouth of the buckle part is defined by the base 65 and arms 66 of the channel and the separate plate 56. The buckle is operated in the same manner as is described above for the buckle shown in Figures 1 to 5 and 8.

The lengths of the straps of the harness can be adjusted by, for example, a snubber fitted

to plate 24, a snubber at the upper vehicle fixing 68 (Figure 11) and/or the lower vehicle fixing 69, one or more snubbers carried by the harness straps, or the straps can be adjusted by spring wound reels with manually or inertia controlled brakes.

If a double snubber is used, it could be of the construction shown in Figures 12 and 13. This comprises a frame 70 with a central part 71 separating two apertures 72 and 73. Snubbing plates 74 and 75 are fixed by rivets 76 and 77 respectively to the central part 71 of the frame, the central part being provided with elongated holes 90 to allow the snubbing plates 74 and 75 to slide relative to the frame and to the apertures 72 and 73 for straps of the harness. The arrangement allows for separate adjustment of the two straps on which the pull is in opposite directions. In Figure 12, the snubber 74 is in the gripping position and the snubber 75 in the strap adjusting position.

Instead of two apertures, a frame 78 with one aperture 79 only can be provided as shown in Figure 14. In this case the snubbing plates are arranged to slide in channels provided by flanges 80 at the sides of the frame.

The two straps can be adjusted by passing both straps through a single snubber. The snubber can be mounted on a short strap carried by plate 24 so that the snubber is nearer the lap of the wearer.

The two strap plate shown in Figure 9 is particularly useful if it is required to separate the positions of pull of the two straps of a harness to provide for the lap strap to hold the legs and the chest strap to pass across the pelvis. In some cases it is desirable for the two straps to be separately fitted to the buckle. This could be done by ending one of the straps in a snubber through which the plate at the end portion of the second strap is passed before the plate is inserted in the mouth of the buckle. Or the buckle could include two plates 24, one plate for each strap, and two bumps, one for each plate, a single slidable element engaging the two plates or two slidable elements, one for each plate, being provided to hold the plates within the casing.

The buckle of this invention is particularly adaptable for use with systems in which a warning is given if an attempt is made to start the vehicle before the safety harness has been fixed, or where some mechanical or electrical equipment is provided to prevent the vehicle being started before the safety harness has been properly adjusted. Since the plate of buckle must be pressed into the mouth of the buckle and the two parts of the buckle held in the latched condition, a switch within the buckle can easily be arranged to be operated by the plate when in the latching position, the switch controlling the warning or prevention system. With the buckle mounted near to the floor of a vehicle by means of its bracket or cable, the

electrical connections required from the buckle can be provided easily and without trailing wires.

WHAT WE CLAIM IS:—

- 5 1. A buckle of the type defined in which one part includes a plate having one or more apertures to which one or more strap end portions can be fitted and the second part, which includes the slidable element, has a means by
10 which the said part can be connected to a road vehicle or aircraft and a mouth into which part of the said plate can be placed, the said slidable element, when in the position in which the two parts are latched together, forming part
15 of the surface of the buckle adjacent the said mouth such that the said slidable element can be moved by hand from that position into the position in which the two parts of the buckle can be separated.
- 20 2. A buckle as claimed in Claim 1 in which the said slidable element is carried by a channel in the casing.
3. A buckle as claimed in Claim 2 in which the said slidable element is provided with
25 grooves which engage the said channel member.
4. A buckle as claimed in Claim 3 in which the said grooves are undercut.
5. A buckle as claimed in any preceding claim in which the said means by which the
30 said second part can be connected to a road vehicle or aircraft comprises a substantially rigid cable.

6. A buckle as claimed in Claims 2, 3, or 4 in which the said means by which the said second part can be connected to a road vehicle or aircraft comprises a bracket connected to the channel.

7. A combination comprising a buckle as claimed in Claim 6 and a mounting to which said bracket is movably connected.

8. A harness including a buckle as claimed in any of claims 1 to 6 or a combination as claimed in Claim 7 in which means is provided for adjusting the effective lengths of the said strap end portion or portions.

9. A harness as claimed in Claim 8 in which the said means comprises a double snubber.

10. A harness as claimed in any of Claims 1 to 6 substantially as described with reference to Figures 1 to 5 and Figures 8 or 9 of the accompanying drawings.

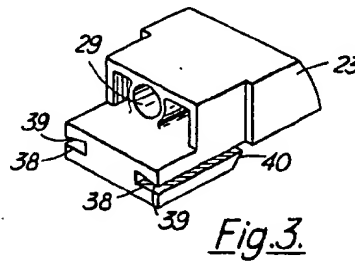
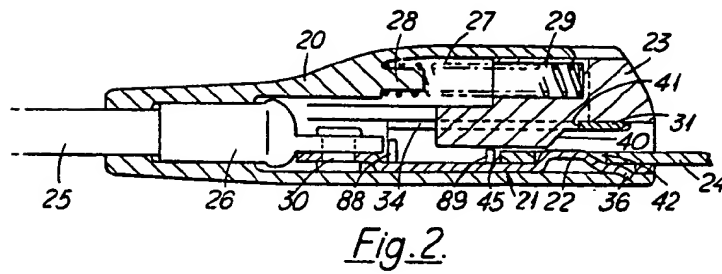
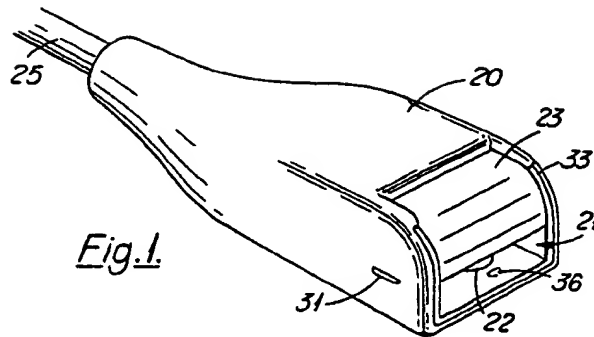
11. A buckle as claimed in any of Claims 1 to 6 substantially as described with reference to Figure 10 and Figures 8 or 9 of the accompanying drawings.

12. A road vehicle or aircraft fitted with one or more buckles, combinations or harnesses as claimed in any preceding claim.

13. A vehicle safety harness fitted with a two part buckle as claimed in any of Claims 1 to 6 substantially as described with reference to the accompanying drawings.

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For the Applicants.

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COMPLETE SPECIFICATION

6 SHEETS

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Sheet 2

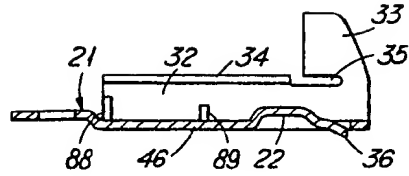


Fig. 4.

Fig. 5.

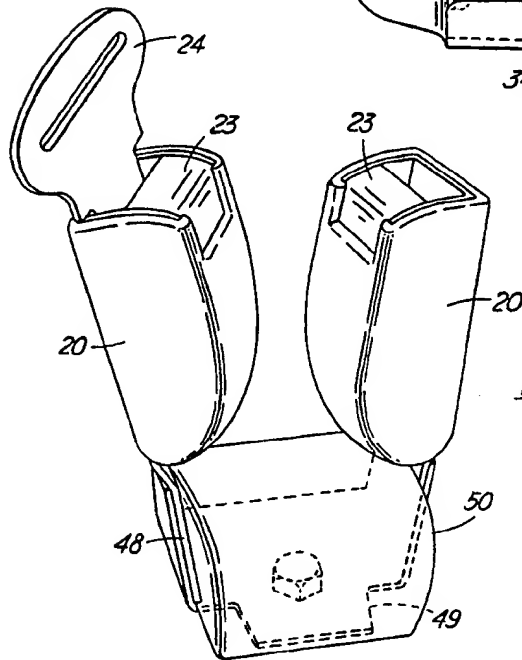
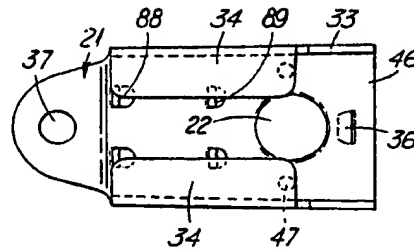


Fig. 6.

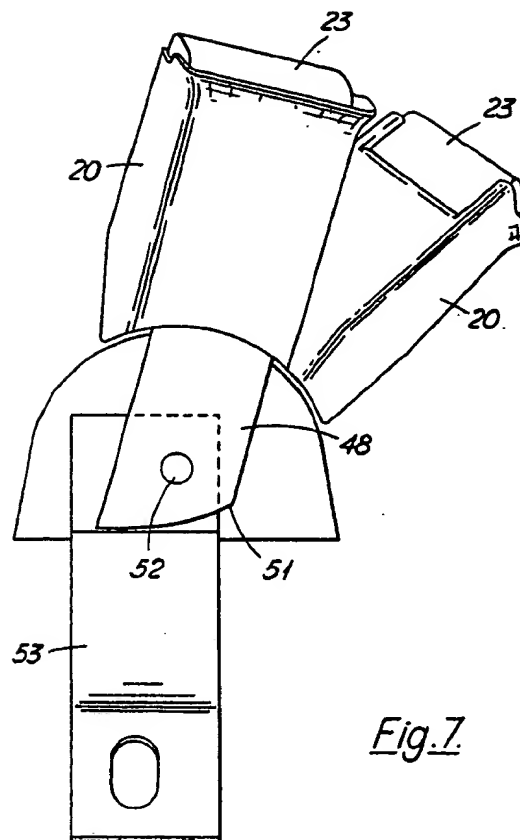


Fig. 7.

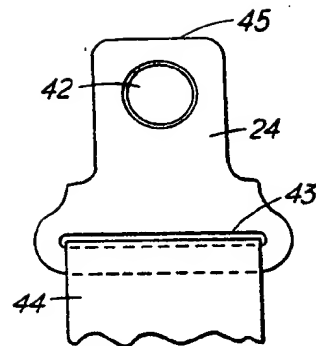


Fig. 8.

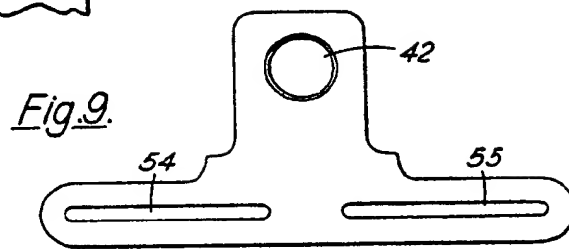


Fig. 9.

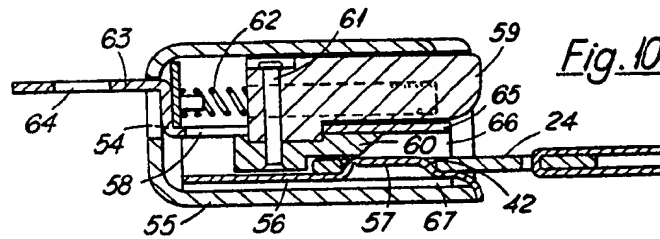


Fig. 10.

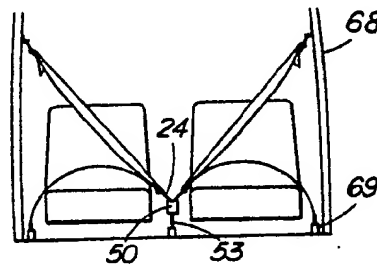


Fig. 11.

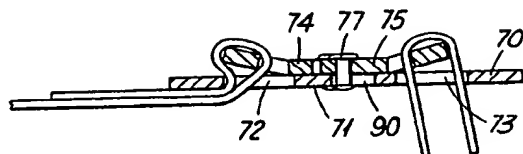


Fig. 12.

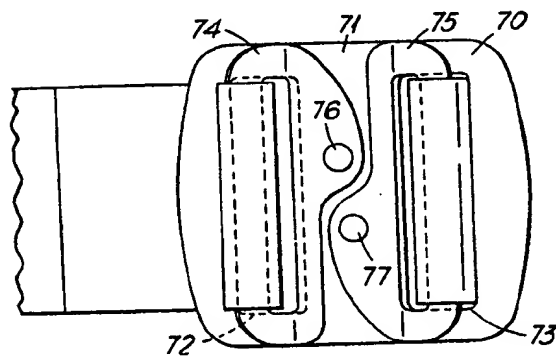


Fig. 13.

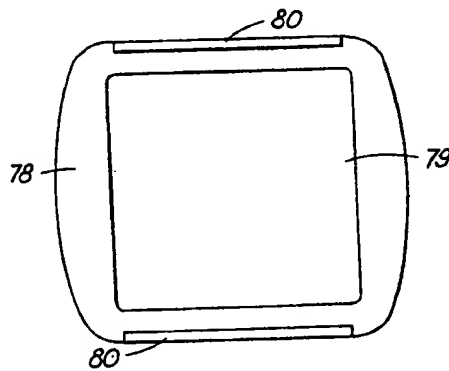


Fig. 14.

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COMPLETE SPECIFICATION

6 SHEETS

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the Original on a reduced scale

Sheet 6



Fig. 15.

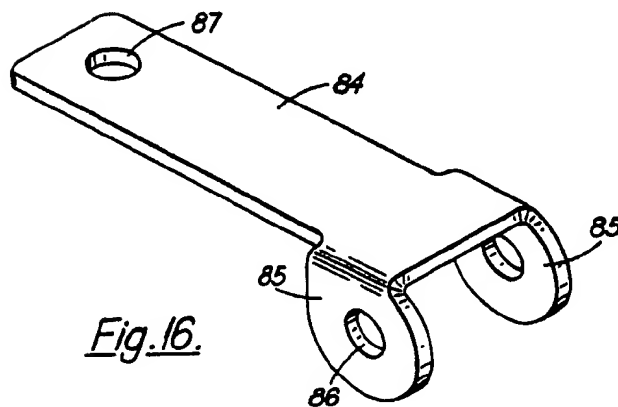


Fig. 16.